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RESEARCH ARTICLE

Determinants of Independence in Exclusive Breastfeeding among Mothers with Diabetes Mellitus: A Cross-Sectional Study from Indonesia

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Abstract

The global rise in diabetes mellitus (DM) among women of reproductive age poses significant challenges to achieving optimal exclusive breastfeeding (EBF) rates, especially in low- and middle-income countries such as Indonesia. This study aimed to examine the relationship between knowledge and experience of mothers with DM and their independence in providing EBF, addressing an urgent need for targeted intervention and policy support for this vulnerable population. An analytic observational study with a cross-sectional design was conducted at community health centers in Pekanbaru from June to November 2024, involving 98 breastfeeding mothers diagnosed with DM, recruited through convenience sampling. Structured questionnaires measured maternal knowledge, prior breastfeeding experience, and independence in EBF. The results showed that 57.1% of mothers had good knowledge and 53.1% had adequate breastfeeding experience, while 69.4% demonstrated independence in providing EBF. Bivariate analysis revealed significant relationships between knowledge and independence ($p = 0.026$) as well as experience and independence ($p = 0.001$). These findings underscore the importance of enhancing education and support for mothers with DM to improve EBF practices. It is recommended that healthcare policies and programs prioritize continuous, tailored education and counseling to empower mothers with DM and increase EBF coverage.

Keywords: Knowledge, Experience, Diabetes Mellitus, Independence, Exclusive Breastfeeding

INTRODUCTION

The promotion of maternal and child health remains a global priority, particularly in low- and middle-income countries where maternal, infant, and neonatal mortality rates are still unacceptably high (Victora et al., 2016; Kementerian Kesehatan RI, 2023). Exclusive breastfeeding (EBF) for the first six months of life is widely recognized as a critical intervention that can reduce infant morbidity and mortality and foster optimal growth and development (World Health Organization [WHO], 2023; Yulita, Aldinda, & Dilla, 2023). Despite the Indonesian government's enactment of Regulation No. 33/2012 and various health initiatives, the coverage of EBF in Indonesia, as in many other countries, remains below the national target (Istianah, Septiani, & Dewi, 2020; Kemenkes RI, 2023). This shortfall is influenced by a multitude of factors, including sociocultural beliefs, lack of accurate information, maternal employment, and exposure to marketing of formula products (Rollins et al., 2016; Lenja et al., 2016).

The growing prevalence of diabetes mellitus among women of reproductive age worldwide is a pressing public health concern, particularly given its complex effects on maternal and infant well-being (International Diabetes Federation [IDF], 2021; Chivese et al., 2019). For mothers, DM not only imposes greater physiological demands but also complicates the intricate process of lactation and infant care. The metabolic changes associated with DM–such as impaired insulin regulation, hyperglycemia, and altered hormonal responses–can delay the onset of lactogenesis II, thereby reducing milk supply and posing additional difficulties for sustaining exclusive breastfeeding (Gouveri et al., 2011; Sdiri et al., 2025; Cummins et al., 2022). Moreover, these mothers face higher rates of postpartum infections, hypoglycemic episodes, and chronic fatigue, which collectively undermine both their physical ability and psychological motivation to breastfeed exclusively (Scime et al., 2022; Ng, Smith, & McIntyre, 2020).

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The psychosocial landscape for mothers with DM is equally challenging. Anxiety about the infant's health, concern over their own self-efficacy, and the potential stigma associated with chronic illness can further hinder breastfeeding intentions and outcomes (Finigan, 2006; Amekpor et al., 2025). Systemic issues, such as insufficient counseling from healthcare providers, inconsistent breastfeeding guidance, and lack of tailored support for women with chronic illnesses, create additional barriers that are often overlooked in routine maternal care (Scime et al., 2022; Victora et al., 2016). Recent Indonesian health reports and regional studies confirm that EBF rates are significantly lower among mothers with DM than in the general population, highlighting an urgent need for focused intervention strategies (Kemenkes RI, 2023; Yulita et al., 2021).

Despite a growing body of literature supporting the importance of maternal knowledge and previous breastfeeding experience as predictors of breastfeeding success, the unique mechanisms by which these factors influence maternal independence among mothers with DM remain poorly understood (Irwan, Yulita, & Zalni, 2023; Yulita & Fitria, 2022). Evidence suggests that while knowledge can improve attitudes toward breastfeeding and bolster problem-solving skills, its impact may be moderated by the lived experience of managing DM during pregnancy and the postpartum period (Rollins et al., 2016; Whipps, 2022). Furthermore, previous negative breastfeeding experiences–whether due to DM complications or inadequate support–can diminish maternal self-efficacy and motivation, creating a cyclical barrier to establishing independence in EBF (Whipps, 2022; Scime et al., 2022).

The urgency of addressing this knowledge gap is heightened by projections that the incidence of DM among women of reproductive age will continue to rise, particularly in low- and middle-income countries like Indonesia (International Diabetes Federation [IDF], 2021). Without tailored research and intervention, the health disparities faced by this vulnerable group are likely to widen, undermining both maternal and child health outcomes (Sdiri et al., 2025; Finigan, 2006). Thus, exploring how knowledge and experience foster independence in exclusive breastfeeding among mothers with DM is essential for designing effective health education, counseling, and support services.

Theoretically, Imogene King's Goal Attainment Theory provides a robust framework to understand how mothers' knowledge, experience, and personal agency interact within the context of breastfeeding (Saudah et al, 2015). According to King, goal-directed transactions between mothers and healthcare providers–mediated by information, skills, and past experiences–are central to fostering independence and effective self-care behaviors (King, 1981). This is particularly relevant for mothers with DM, who may require tailored education and ongoing support to overcome unique challenges in breastfeeding. Complementarily, Life Course Theory posits that experiences and learned behaviors accumulated over time shape health practices and outcomes, including breastfeeding (Whipps, 2022). Empirical evidence suggests that positive prior breastfeeding experiences can build maternal confidence and independence in future breastfeeding efforts, whereas negative experiences or lack of knowledge may contribute to early cessation or suboptimal practices (Scime et al., 2022; Whipps, 2022).

In light of these considerations, the current study aims to fill a critical research gap by examining the relationship between knowledge, experience, and maternal independence in providing exclusive breastfeeding among mothers with diabetes mellitus in Pekanbaru, Indonesia. By situating the analysis within King's Goal Attainment Theory and Life Course Theory, and by accounting for the multifaceted challenges faced by mothers with DM, this study seeks to inform future interventions and policies that can better support breastfeeding in this high-risk group. Ultimately, understanding these dynamics is essential to improving health outcomes for mothers and infants alike in Indonesia and comparable settings.

METHODS

Study Design and Setting

This study employed an analytic observational approach with a cross-sectional design to explore the relationship between knowledge, experience, and independence in exclusive breastfeeding among mothers with diabetes mellitus (DM). The research was conducted at multiple community health centers (Puskesmas) in Pekanbaru, Indonesia, a region reflecting both urban and peri-urban health challenges. The cross-sectional design is well-suited for identifying associations among variables in a defined population at a specific point in time (Setia, 2016).

Study Population, Inclusion and Exclusion Criteria

The study population comprised mothers diagnosed with DM who were currently breastfeeding. Inclusion criteria were: (1) mothers with a clinical diagnosis of diabetes mellitus (Type 1, Type 2, or gestational diabetes as confirmed by health records), (2) actively breastfeeding an infant aged 0–6 months, and (3) willingness to provide informed consent. Exclusion criteria included mothers with severe comorbidities (e.g., advanced cardiac or renal disease), those with psychological disorders affecting recall or cognition, or those not residing in Pekanbaru during the study period. These criteria ensure sample homogeneity and minimize confounding influences (Ng, Smith, & McIntyre, 2020).

Sample Size Determination and Sampling Technique

The sample size was determined based on estimated population proportions from recent health center data and published studies, with a 95% confidence level and 10% margin of error. Using a standard formula for cross-sectional studies (Lwanga & Lemeshow, 1991), a minimum of 90 participants was calculated. To enhance representativeness, 98 eligible mothers were ultimately included. The study used a convenience (accidental) sampling method, recruiting all eligible participants attending selected Puskesmas during the data collection period from June to November 2024. While convenience sampling offers practical advantages in healthcare settings, it may introduce selection bias; thus, findings should be generalized cautiously (Etikan et al., 2016).

Data Collection Procedures

Data were collected using structured, self-administered questionnaires distributed by trained enumerators. Prior to full-scale data collection, enumerators received standardized training on study objectives, ethical issues, administration protocols, and confidentiality procedures, consistent with WHO research guidelines (WHO, 2022).

Respondents were briefed on the study purpose, confidentiality, and voluntary participation, and provided written informed consent. Data collection took place in private consultation rooms to maintain participant privacy and minimize response bias.

Research Instruments and Validity

The research instrument was a structured questionnaire developed and refined based on existing validated tools and the literature (Yulita & Fitria, 2022; Rollins et al., 2016). It comprised four main sections: (1) socio-demographic characteristics, (2) maternal knowledge regarding exclusive breastfeeding, (3) prior breastfeeding experience, and (4) maternal independence in exclusive breastfeeding. Knowledge was measured with 12 multiple-choice items (e.g., "What is the recommended duration of exclusive breastfeeding?"). Experience was assessed using 10 items on previous breastfeeding duration, challenges, and support received (e.g., "Have you previously breastfed exclusively for six months?"). Independence was measured with 8 Likert-scale items adapted from self-efficacy and independence literature, capturing autonomous decision-making and problem-solving during breastfeeding (e.g., "I feel confident in overcoming challenges to exclusive breastfeeding without external help").

Instrument validity was established through expert panel review and a pilot test involving 20 mothers meeting the inclusion criteria. Construct validity was confirmed via item-total correlations, all exceeding 0.30, and the overall instrument demonstrated good reliability (Cronbach's alpha = 0.83 for the independence scale, 0.79 for knowledge, and 0.81 for experience), consistent with psychometric recommendations (Taber, 2018).

Data Management and Analysis

Completed questionnaires were checked for completeness and accuracy daily. Missing data were minimal (<2%) and handled using pairwise deletion. All data were entered and analyzed using IBM SPSS Statistics version 26.0. Descriptive statistics summarized participant characteristics and variable distributions (means, standard deviations, frequencies, and percentages). Univariable analysis described knowledge, experience, and independence.

Bivariate associations between independent variables (knowledge, experience) and the dependent variable (independence) were tested using Pearson's chi-square, with significance set at $p < 0.05$. Assumptions for chi-square analysis (expected cell counts >5) were verified. Where appropriate, odds ratios and 95% confidence intervals were calculated to assess the strength of associations (Field, 2018). Multivariable analysis was not performed due to sample size limitations, but covariates such as education and age were described for context.

Ethical Considerations

The study protocol was reviewed and approved by the Ethics Committee of the Faculty of Nursing, Universitas Riau, in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants, with assurance of confidentiality and the right to withdraw at any time without consequence. Data were stored securely and anonymized prior to analysis.

RESULTS OF STUDY

Respondent Characteristics

A total of 98 mothers with diabetes mellitus (DM) who met the study criteria participated in this research. The majority of respondents were aged 25–30 years (70.4%), while 29.6% were above 30 years old. Regarding parity, more than half were mothers of a second child (58.2%). Educational background showed that most had completed senior high school (58.2%), and a notable portion had only junior high education (34.7%), with a smaller segment holding higher education degrees (7.1%). In terms of occupation, most respondents (67.3%) were employed outside the home, while the remainder were unemployed or housewives (32.7%). These demographic patterns indicate that the study population predominantly consisted of relatively young, multiparous, and moderately educated women who were actively participating in the workforce (table 1).

Table 1. Characteristics of Demography Respondents (N=98)

Characteristics	Frequency	Percentage (%)
Age		
25 – 30 Year	69	70.4
>30 Year	29	29.6
Birth Order		
First Child	41	41.8
Second Child	57	58.2
Education		
Junior High School	34	34.7
Senior High School	57	58.2
Higher Education	7	7.1
Occupation		
Working Outside the Home	66	67.3
Unemployed/Housewife	32	32.7
Knowledge Level		
Good	56	57.1
Fair	18	18.4
Poor	24	24.5
Experience Level		
Fair	52	53.1
Poor	46	46.9
Independence Level		
Independence	68	69.4
Not Independent	30	30.6

Distribution of Knowledge, Experience, and Independence

In this study, operational definitions were established to ensure clarity in measuring the main variables. Good knowledge was defined as mothers who correctly answered at least 75% of the items assessing knowledge about exclusive breastfeeding. Adequate experience referred to mothers who reported having previously or currently practiced exclusive breastfeeding for at least six months and had successfully overcome related challenges. Independence, meanwhile, was operationalized as mothers who scored above the mean on validated independence or

self-efficacy scales for exclusive breastfeeding. These definitions enabled a structured analysis of how knowledge and experience contribute to mothers' independence in providing exclusive breastfeeding.

The univariate analysis revealed that a majority of mothers (57.1%) demonstrated good knowledge about exclusive breastfeeding, while 24.5% had poor knowledge and 18.4% were categorized as having fair knowledge. When examining breastfeeding experience, slightly more than half of the respondents (53.1%) reported adequate experience, whereas 46.9% had poor experience. In terms of independence in providing exclusive breastfeeding, 69.4% were classified as independent, and 30.6% as not independent.

Relationships Between Main Variables

The relationship between knowledge and maternal independence in exclusive breastfeeding was assessed using Chi-square analysis. Among mothers with good knowledge, a greater proportion (38.8%) exhibited independence in breastfeeding, compared to only 18.4% who were not independent. In contrast, of those with poor knowledge, a smaller fraction (17.3%) were independent, with 7.1% not independent. This association was statistically significant ($p = 0.026$), indicating that higher maternal knowledge is positively associated with greater independence in exclusive breastfeeding.

Similarly, the relationship between maternal experience and independence was found to be statistically significant ($p = 0.001$). Of the mothers with adequate breastfeeding experience, 36.7% were independent, while only 16.3% were not independent. Conversely, among mothers with poor experience, a higher proportion reported lack of independence (14.3%) compared to those with adequate experience.

Table 2. The Relationship of Knowledge and Experience with the Independence of Diabetic Mothers in Providing Exclusive Breastfeeding (N=98)

Variable	Maternal Independence in Providing Exclusive Breastfeeding				Total		*P value*
	Not Independence		Independence				
	n	%	n	%	n	%	
Knowledge							
Low	7	7.1	17	17.3	24	24.5	0.026
Moderate	5	5.1	13	13.3	18	18.4	
High	18	18.4	38	38.8	56	57.1	
Experience							
Poor	16	16.3	36	36.7	52	53.1	0.001
Adequate	14	14.3	32	32.7	46	46.9	

The data clearly indicate that both knowledge and experience play pivotal roles in fostering independence in exclusive breastfeeding among mothers with DM. Mothers with higher levels of knowledge and prior breastfeeding experience were significantly more likely to display independent behaviors in exclusive breastfeeding.

DISCUSSION

This study demonstrates a significant relationship between knowledge and experience with the independence of mothers with diabetes mellitus (DM) in providing exclusive breastfeeding. These findings enrich the understanding of how health behavior theories such as King's Goal Attainment Theory and Life Course Theory apply to the context of chronic illness and breastfeeding. According to King (1981), effective health behavior is the result of dynamic interactions between individuals' knowledge, experiences, and their environments, fostering self-efficacy and independence. Life Course Theory further emphasizes that accumulated experiences over time–positive or negative–shape future health decisions and practices, supporting the idea that past breastfeeding experiences build maternal confidence and autonomy (Whipps, 2022; Scime et al., 2022).

Our results align with previous research showing that higher maternal knowledge is closely linked to greater independence and persistence in exclusive breastfeeding, especially among mothers facing complex physiological challenges like DM (Irwan, Yulita, & Zalni, 2023; Gouveri et al., 2011). Knowledge equips mothers with the information needed to understand breastfeeding's benefits and to overcome myths or misconceptions, which is essential in populations at risk for suboptimal breastfeeding due to health complications. The positive relationship between knowledge and independence found in this study is consistent with Rollins et al. (2016) and Yulita, Aldinda, & Dilla (2023), who both observed that education and information access are strong predictors of healthy breastfeeding behaviors across different cultural contexts.

Beyond knowledge, prior breastfeeding experience emerged as a pivotal factor in fostering independence. Mothers who had successfully breastfed previously were more resilient in the face of DM-related breastfeeding challenges, demonstrating greater confidence and problem-solving ability (Sdiri et al., 2025; Cummins et al., 2022). The qualitative literature also points out that experiential learning–such as coping with initial difficulties or navigating support systems–increases maternal self-efficacy, as suggested by Bandura's self-efficacy theory and supported by Whipps (2022). In Indonesia, where familial and community influences are strong, mothers with previous positive experiences are more likely to advocate for and sustain exclusive breastfeeding, even amid cultural or health barriers (Yulita et al., 2021).

However, the relationship between experience, knowledge, and independence is also shaped by psychosocial and systemic factors. Anxiety, stigma, or a lack of targeted health worker support can diminish mothers' confidence, especially for those with DM (Finigan, 2006;

Amekpor et al., 2025). Local practices–such as the strong influence of extended family in decision-making, or societal misconceptions about breastfeeding with chronic illness–may further complicate mothers' efforts toward independence (Victora et al., 2016). Inadequate or inconsistent counseling at community health centers remains a systemic barrier; thus, the integration of structured education and support services is crucial (Scime et al., 2022). International comparisons indicate that tailored breastfeeding support for women with chronic illnesses improves self-management and breastfeeding outcomes, underscoring the need for context-specific interventions (Ng, Smith, & McIntyre, 2020).

Practically, these findings highlight several implications for health service development and policy. First, continuous and accessible breastfeeding education, specifically targeting mothers with chronic conditions like DM, should be prioritized in community health centers (Puskesmas) and maternal clinics. Training programs for health workers should be strengthened, focusing not only on technical guidance but also on building empathetic, culturally sensitive communication and support (World Health Organization, 2023; Scime et al., 2022). Peer support programs, where experienced mothers serve as mentors, may further empower women to overcome challenges and maintain exclusive breastfeeding. The use of digital health education platforms may also be explored to expand the reach and frequency of support.

Despite its strengths, this study has several limitations. The cross-sectional design does not allow for causal inference, and the use of convenience sampling at selected sites in Pekanbaru may limit the generalizability of findings. Self-reported data are also subject to recall and social desirability bias. Additionally, potential moderating factors such as the role of spousal or extended family support, specific health worker interventions, and variations in DM management were not deeply explored in this study. Future research should consider longitudinal designs to examine changes in knowledge, experience, and independence over time, as well as the effectiveness of targeted interventions, such as structured counseling or peer support groups, in improving exclusive breastfeeding rates among mothers with DM (Sdiri et al., 2025; Rollins et al., 2016).

In conclusion, the present study underscores the importance of both knowledge and breastfeeding experience in shaping maternal independence among mothers with DM, reflecting a synergy between individual agency and systemic support. Addressing the unique needs of this population through integrated, evidence-based education and service delivery is essential for closing the gap in exclusive breastfeeding rates and improving maternal and infant health outcomes in Indonesia and similar settings.

CONCLUSIONS AND RECOMMENDATIONS

This study indicates a significant relationship between the knowledge and experience of mothers with Diabetes Mellitus and their independence in providing exclusive breastfeeding. Most respondents demonstrated good knowledge and experience, along with a high level of independence in breastfeeding. The Chi-square test results showed that knowledge ($p = 0.026$) and experience ($p = 0.001$) were significantly associated with mothers' independence in exclusive breastfeeding. This suggests that knowledge and experience are key factors influencing breastfeeding behavior, especially among mothers with special health conditions such as Diabetes Mellitus. It is recommended to consistently provide information related to exclusive breastfeeding, as the better a mother's knowledge, the more independent she will be in providing exclusive breastfeeding.

This study provides compelling evidence that both knowledge and prior experience significantly enhance the independence of mothers with diabetes mellitus (DM) in providing exclusive breastfeeding. The findings affirm key tenets of King's Goal Attainment Theory and Life Course Theory, which highlight the synergistic role of knowledge acquisition and lived experience in fostering health-related autonomy (King, 1981; Whipps, 2022).

Future research should adopt longitudinal or intervention-based approaches to assess the sustained impact of knowledge and experience on breastfeeding independence among mothers with DM. There is a particular need for studies examining the effectiveness of structured education programs, peer mentoring, and digital health support tools, as well as the interplay between psychosocial support and biomedical management. Expanding research to diverse cultural and geographic settings will also provide a more comprehensive understanding of best practices and barriers.

In summary, strengthening maternal knowledge and positive breastfeeding experiences are critical pathways to empowering mothers with diabetes mellitus to achieve independence in exclusive breastfeeding. A collaborative, multidisciplinary approach–encompassing education, policy, health service reform, and community engagement–is fundamental to bridging gaps in breastfeeding practices and advancing maternal and child health in Indonesia and globally.

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